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CENOZOIC.—The following is the history of Crater Lake, Oregon, as worked out by Mr. J. S. Diller.

During the early glacial period Crater Lake did not exist, its site being occupied by an active volcano, Mt. Mazama. During the final great eruption of this volcano its summit caved in giving rise to a caldera nearly six miles in diameter and four thousand feet deep. Upon the bottom of the caldera volcanic activity continued. There were new eruptions forming cinder cones and lava fields partially re-filling the great pit. Volcanic activity ceasing, the conditions were favorable for water accumulation and Crater Lake was formed in the pit. (*Amer. Journ. Sci.*, Vol. II, 1897.)

From a study of parts of Labrador and Baffin Land Mr. R. S. Tarr concludes that all of that region, except possibly, the highest parts, has been buried beneath an ice sheet and there is evidence that the ice has withdrawn from these regions in very recent times. Down cutting of the surface by glacial action is more marked in Labrador than in Baffin Land. Post-glacial weathering is very pronounced in both regions. (*Amer. Geol.*, Vol. XIX, 1897.)

BOTANY.¹

Botanical Society of America.—The Third Annual Meeting of the Society will be held in Toronto on Tuesday and Wednesday, August 17th and 18th, 1897, under the presidency of Dr. John M. Coulter. The Council will meet at 1 P. M. on Tuesday, and the first session of the Society will begin at 3 P. M. The address of the retiring President, Dr. Charles E. Bessey, will be given on Tuesday evening at 8 o'clock.

The British Association for the Advancement of Science will meet in Toronto, August 18th to 25th. The opening address is to be given on Wednesday evening, August 18th. Professor A. B. Macallum, President of the Local Executive Committee, writes:

“A great many of the members of the Botanical Section of the B. A. S. are booked to leave Liverpool August 5th. They will arrive in Quebec and Montreal, if they make the usual time, by the 14th and 15th respectively, and will be in Toronto on Tuesday evening (17th) at latest. Some may stay over at Montreal and Ottawa and possibly

¹ Edited by Prof. C. E. Bessey, University of Nebraska, Lincoln, Nebraska.

Kingston, arranging to arrive in Toronto Wednesday morning. The latter date will find nearly all of them here. Those who do not come via Quebec will turn up in Toronto at an earlier date probably. We expect a fairly large contingent, including some continental botanists of note."

It is expected, therefore, that this meeting will give unusual opportunities for renewing or forming acquaintances among British and continental botanists. By authority of the Council all foreign botanists present will be invited to sit as associate members of the Society and to read papers. This invitation will be addressed personally to all whose intention to come Toronto is known, and will also be published in *Nature* and the *Journal of Botany*.

A later announcement will contain information regarding R. R. rates, hotels, rooms for meeting, and other business to be submitted to the Society.—C. R. BARNES, *Secretary*.

Botany in the National Educational Association.—It is encouraging to notice that in the great gatherings of teachers modern methods in science teaching are receiving attention. Last year in the Buffalo meeting of the National Educational Association, Professor Atkinson, of Cornell University, and Professor Spalding, of the University of Michigan, discussed the educational value of botany. This year in the Milwaukee meeting Professor Barnes, of the University of Wisconsin, is to read a paper on "What can the High School do with Botany?" It is to be hoped that the masters in botany will continue to take part in these discussions. The teachers in the secondary schools are quite generally ready to receive suggestions as to better methods when given by those who are entitled to speak with authority.

CHARLES E. BESSEY.

The Marine Biological Laboratory at Wood's Holl, Mass.—The tenth season of this useful laboratory is announced. The botanical instruction will cover a period of six weeks from July 6th, and will be conducted by Dr. Bradley M. Davis, of the University of Chicago. Two courses will be offered, viz., (1) on Elementary Botany, and (2) on the Morphology of the Algæ. In the first one week each will be given to Algæ, Fungi, Bryophytes and Pteridophytes, and two weeks to the Spermatophytes. There should be many students in attendance. The botanical advantages of Wood's Holl should attract many of the teachers in the High Schools and smaller colleges.

CHARLES E. BESSEY.

A New Beginner's Botany.—In a neat little volume published by The Macmillan Company, Professor Setchell has given us his ideas of laboratory practice for beginners in botany. These successive volumes from the professors of Botany in the universities are interesting, since they show us what their authors think can be done in the secondary schools under present conditions. They are thus contributions to the science of education, and ought to be judged accordingly.

In this book Professor Setchell puts before us his plan of presenting elementary botany to beginners, resting it upon two general conclusions reached after experience "with a number of classes of beginners both in the preparatory schools and the university" as follows:

"Botany in the preparatory schools should be taught—

"1. As a science, to cultivate careful and accurate observation, together with the faculty of making from observations the proper inferences; and

"2. As a means of leading the mind of the student to interest itself in the phenomena of nature for its own further development and profit."

These are certainly sound principles, and we may welcome the book as the author's exposition of them. Upon opening it at page 1, we find that the pupil is directed to "take a ripened pod of a Bean Plant, and splitting it open, notice:

"1. That the seeds (Beans) are attached along one edge of each valve (or half) of the pod.

"2. That each bean is attached to the pod by a short stalk, the *funiculus*.

"3. Make a sketch of a valve of the bean pod with its enclosed beans, representing and labelling the parts."

In this way the separate beans are taken up and their details worked out until the pupil has a knowledge of the pod, valves seeds, funiculus, hilum, strophiole, seed-coats, raphe, micropyle, chalaza, embryo, cotyledons, caulicle, plumule, etc. Peas, Castor-beans, Morning-glory seeds, Indian Corn, Onion seeds, and seeds of Piñon Pine are to be taken in succession and studied in like manner. Then seedlings are studied, followed by roots, stems, leaves, (including phyllotaxy) and buds. Next follow chapters on protection (thorns, spines, hairs, bitter or acid juice), storage (in roots, bulbs, leaves, etc.), climbing plants, epiphytes, parasites, saprophytes and insectivorous plants, in which the pupil is made acquainted with these various subjects by a laboratory study of fresh examples. Thus the author leads the pupil on through the structure of flowering plants, always by means of actual examples.

The book thus emphasizes the principle that botany is the study of *plants*, not the study of *books*. Books, however, are not to be ignored or neglected, and short lists of desirable reference books are given. It is significant of the spirit of the book that it is only "when the student shall have finished a careful study of the morphology of the more conspicuous plants, and has seen some of the more important modifications of the different organs, to perform different services to the plant," that the author suggests the use of "a suitable manual of the botany of the region, from which the name and relationships of the species may be obtained." But even after this cautious suggestion of the use of a manual, the author is constrained to say that "the name should not be the end for which the work is done," and "the teacher should prevent this searching out of the name and the practice in the use of the analytical key from absorbing the principal portion of the attention." Thus, although the book is distinctly "phanerogamous," it is as emphatically a laboratory manual, as any of the text-books devoted to the minute anatomy of plants.

The last stronghold of the old time text-book botanists is thus assaulted from an unexpected quarter. Hitherto they have been able to defend themselves with more or less success by crying out against early study by the pupil of small and little known things, as cells, nuclei, green slimes, pond scums, etc. (characterized by one educator as "recondite"), and making a great ado over the difficulty (sometimes asserted to be an impossibility) of supplying the secondary schools with compound microscopes. Professor Setchell has turned flowering plant botany into a laboratory study, and has done so without bringing in anything more recondite than seeds and embryos, or more difficult of purchase than pocket lenses and dissecting needles.

It would be easy to find faults in this book (what book on botany is free from them?) but we feel that it is likely to do so much good in certain quarters that we will say no more than that in our opinion elementary botany should include a good deal about the simpler forms of plants, so that the pupil may obtain some idea of types. It is as good a principle in botany as in mathematics, that we must begin with simple things and proceed to the complex, in order to understand the latter. Then again we know from many years of personal experience, and this not in an old and wealthy community, that the purchase of good compound microscopes (duty free), and the installation of small but efficient laboratories in secondary schools, is as easily accomplished for botany as is the purchase of necessary apparatus and the fitting up of proper laboratories for chemistry. In the new state of Nebraska

nearly every accredited high school is now using the compound microscope in the study of plants selected as types of all the greater groups of the vegetable kingdom. We may be permitted to remark, also, that in practice it will be found impossible to secure in nine-tenths of the secondary schools, much of the material suggested by the author for study. In many chapters the teacher may readily make substitutions, but in those relating to epiphytes, parasites, saprophytes and insectivorous plants, this difficulty will prove quite embarrassing.

—CHARLES E. BESSEY.

ZOOLOGY.

The orientation of organisms by light.¹—The problem that the author undertakes to solve is whether the migration of organisms towards or from a source of light is due to differences in intensity or to the direction of the rays. According to Strasburger, whose views have been more or less generally accepted, the determinant factor is the direction of the rays. His conclusions drawn from experiments with swarm spores of *Botrydium* and *Bayopsis* (78) were later (90) confirmed by Loeb in experiments with the larvæ of *Porthesia chrysorrhæa*. But this view of the subject has been opposed by Oltmann (92) as the result of certain experiments performed with *Volvox minor* and *globator*; and Oltman has been supported by Verworn (94).

Davenport and Cannon criticise Oltman's management of his apparatus and themselves attack the problem with what is essentially the method of Strasburger, but use *Daphnia* instead of plants. A small glass trough was painted dead black inside and out and placed on a table at a distance, at its nearest end, of 51 cm. and of 66.5 cm. at its further end, from the light of a gas lamp having a Welsbach burner which was raised 31 cm. above the table. A wedge shaped box with glass bottom and filled with India ink solution served, when needed, as a screen, the thicker portion of the wedge being placed nearest the source of the rays.

Experiments without the screen showed that the *Daphniæ* when introduced at the end of the trough farthest from the source of light

¹ C. B. Davenport and W. B. Cannon. On the Determination of the Direction and Rate of movement of organisms by Light. Reprint from Journ. Phys. XXI, 22-32. From Dr. C. B. Davenport.